

Nitrogen Application Rates and Tissue Level Data for Medjool Dates

This project was completed on September 30, 2010

Project Summary

Dates have been planted in the United States since the 1700's, but there has been an industry in the Yuma area for only the last fifty years. This new industry is distinct in that it has been established with the Medjool cultivar rather than the Deglet Noor cultivar and is irrigated using low-volume irrigation rather than the traditional border flood method. Many of the trees are planted in sandy upland soil rather than in silty loam soil.

Project Approach

To generate data that will allow the Arizona date producer to be more efficient with their nitrogen applications while maintaining or improving yield, fruit size and fruit quality. The funding account for this project began on 12/5/07. We selected four experimental sites, with 100 trees, as follows:

1. Mesa Site #1 - Imperial Date Gardens Block (Near County 19th Street and Avenue B) 25 four-year-old trees on drip irrigation.
2. Mesa Site #2 - Imperial Date Gardens Block (Near County 19th Street and Avenue B) 25 eight-year-old trees on drip irrigation.
3. Valley Site #3 - Silverman 14 Block (Near County 12½ St. and Somerton Avenue) 25 eight-year-old trees on flood irrigation.
4. Valley Site #4 - Vandervoort Block (near County 10th Street and Somerton Avenue) 25 four-year-old trees on flood irrigation.

For each site, there are five single-tree treatments and five replications.

Goals and Outcomes Achieved

Expected Measurable Outcome:

Reach and educate 25 date producers on the optimal N application rates to that allow date producers to be more efficient with their N applications while maintaining or improving yield, fruit size and fruit quality.

Following the end of the quarter, leaves will be processed and analyzed for nutrient content. An additional growth measurement will be taken and final leaf and growth data will be analyzed. Results will be reported to local date growers.

Goals:

To determine the nitrogen requirements for Medjool date palms that will optimize tree yield and fruit quality. To correlate leaf tissue nitrogen levels to the nitrogen requirements and thus establish date palm tissue nutrient level thresholds.

During the first quarter, we had leaves analyzed that were collected during the final quarter of FY 2009 for determination of nutrient content. These leaves were sent to a laboratory (Ward Labs, Kearney, NE) for nutrient analysis. These results are summarized below:

Leaf N concentration (%)		
N rate (Kg/tree)	Site 1	Site 3
0.20	1.634	1.930
0.53	1.582	1.998
0.93	1.566	1.924
1.47	1.520	1.944
2.27	1.543	1.936
	Site 2	Site 4
0.40	1.758	1.578
1.20	1.836	1.520
2.00	1.694	1.564
2.80	1.752	1.626
3.60	1.700	1.646

There was no clear relationship at that point between the leaf N concentrations and the amount of N applied. It is unclear if this is due to a lag time between the N applications and the appearance of N in the leaves, or due to improper sampling technique.

There was no yield collected in the first quarter, because in a few cases, fruiting arms were removed by the cooperators to enhance plant growth (a normal practice), and most of the young trees are not yet bearing.

Treatments for 2010 commenced in the second quarter, on 3/16/10, and terminated on 8/12/10. For the five-year-old trees, the 2010 treatments were 0.30, 0.86, 1.46, 2.14 and 2.94 kg per tree. This is an increase from the 0.2, 0.53, 0.93, 1.47 and 2.27 kg N per tree applied in 2009. For the eight-year-old trees, the 2010 treatments are 0.4, 1.2, 2.0, 2.8 and 3.6 kg of N per tree applied annually, the same as last year. Treatments are split into seven applications, with applications every two weeks. Experimental design is randomized complete block.

Interim tree growth data was collected on 7/21, to see emerging trends, however final tree growth data was collected following cessation of treatments (10/28 and 29). Collection of leaves for analysis was from 9/9 through 9/15. Completion of these tasks completed our data collection goals for the project.

As a result, preparation of leaves for analysis, leaf analysis (Ward Labs, Kearney, NE), and analysis of leaf and growth data was delayed until past the end of the 4th quarter, and results will be reported in 2011.

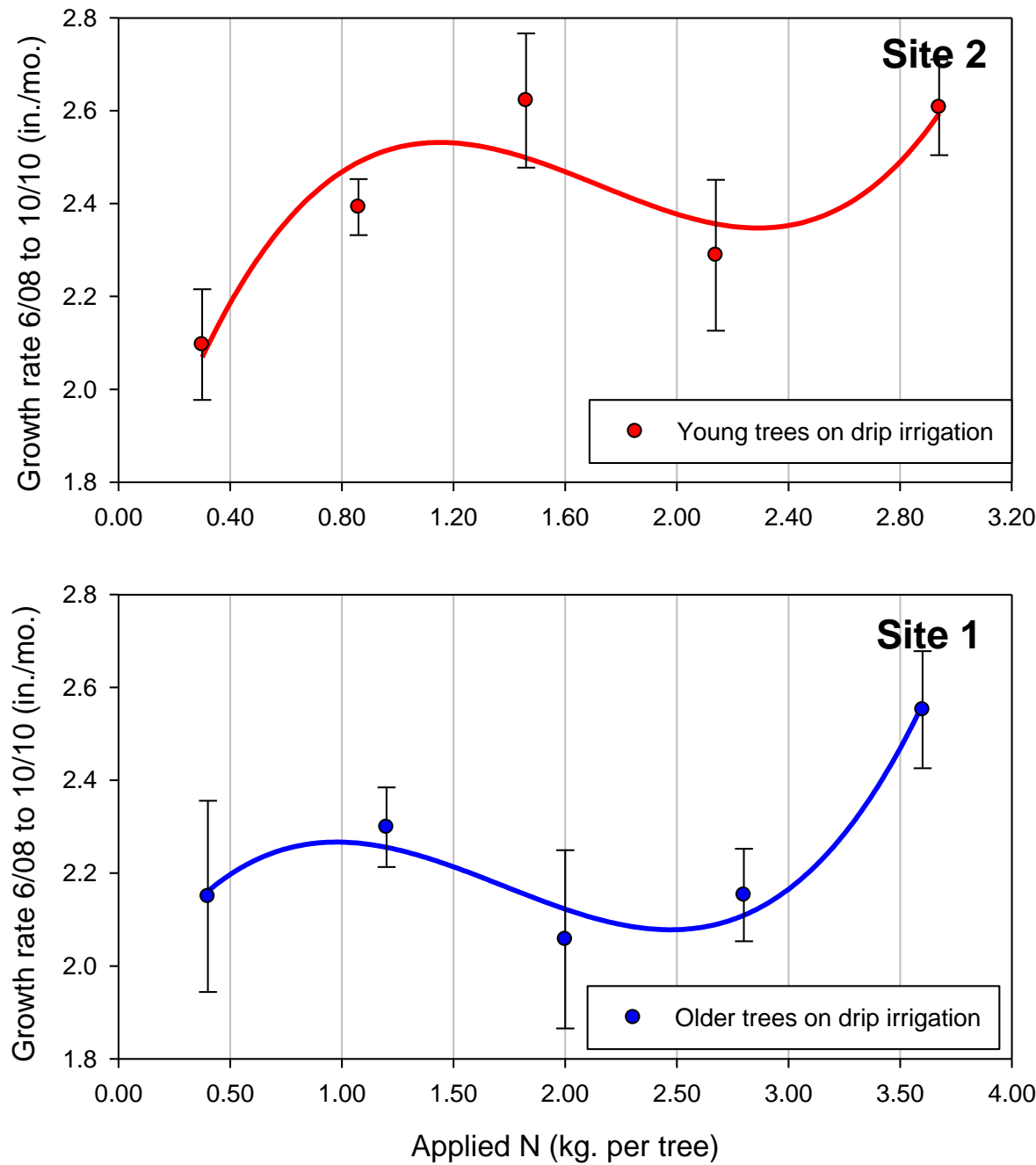
Our grower cooperators have continued with their irrigation and horticultural practices, thus keeping the date palms in good condition.

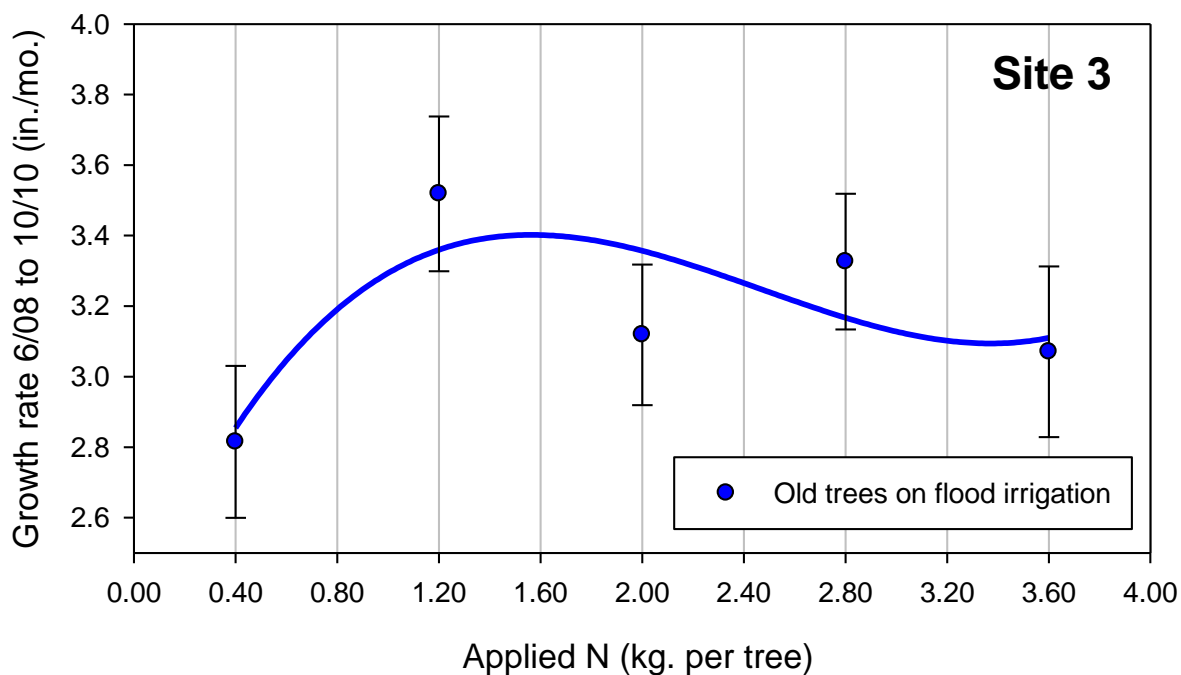
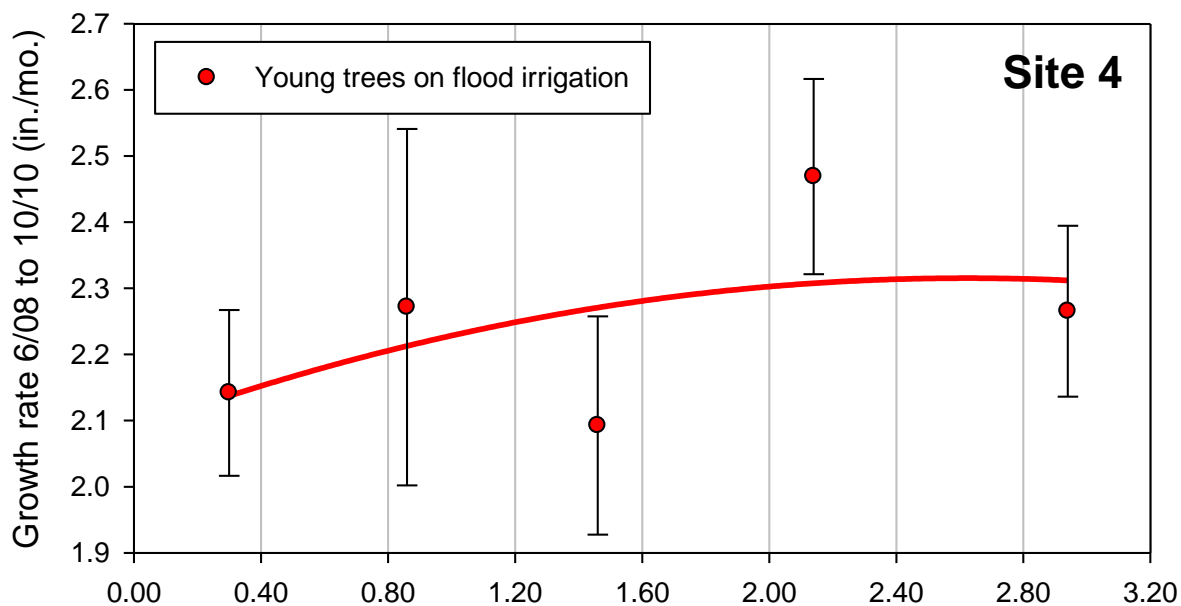
As a result, preparation of leaves for analysis, leaf analysis (Ward Labs, Kearney, NE), and analysis of leaf and growth data was delayed until past the end of the 4th quarter. Results are as follows:

Leaf N concentration (%)		
N rate (Kg/tree)	Site 1 (older trees on drip)	Site 3 (older trees on flood)
0.40	1.618±.021	1.704±.071
1.20	1.626±.046	1.686±.049
2.00	1.680±.034	1.686±.055
2.80	1.654±.042	1.730±.056
3.20	1.656±.054	1.724±.045
	Site 2 (younger trees on drip)	Site 4 (younger trees on flood)
0.30	1.708±.042	1.436±.046
0.86	1.650±.049	1.596±.011
1.46	1.736±.043	1.582±.051
2.14	1.700±.070	1.642±.046
2.94	1.668±.008	1.708±.032

Applications of N have led to increased N concentrations in palm leaves. For trees on drip irrigation, applications of 2.00 kg. N led to the greatest N concentrations, while for trees on flood, any application rates greater than 0.4 kg/tree led to greatest N concentrations.

Results of our growth measurements are as follows:





Growth data suggests that for young trees on both flood and drip irrigation, 1 to 2 kg N per tree appears to lead to the greatest tree growth rate. For older trees on flood irrigation, 1 to 2 kg. N per tree appears to lead to the greatest growth rate, however for older trees on sandy soils using drip irrigation, as much as 3.5 kg. N per tree appears to lead to the greatest growth rate. This may be because N is applied much less efficiently on sandy soils than on the heavier soils that are commonly flooded.

Beneficiaries

Arizona date producers will be able to have more confidence that their N applications are meeting the needs of the plant, and leading to optimum yields and plant growth.

Lessons Learned

Reporting of leaf analysis results was delayed past the September 30th end of the quarter because once a fertilizer application has been applied, it is important to wait until the nutrients have been distributed throughout the plant, and can affect growth. This is the reason for the one month period between final fertilizer application (8/12) and leaf collection (9/9 through 9/15). Final growth measurement was delayed for this reason as well. We received the leaf analysis data from Ward Labs on 12/23/10. Due to the holidays, the data will not be analyzed until after the New Year.

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